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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,377	11/23/2001	Qiang Li	215752US20	2849

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EXAMINER

DASTOURI, MEHRDAD

ART UNIT PAPER NUMBER

2623

DATE MAILED: 05/17/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,377

Applicant(s)

LI ET AL.

Examiner

Mehrdad Dastouri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9.11</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicants' amendment filed February 25, 2004, has been entered and made of record.
2. Applicants' arguments have been fully considered but they are not persuasive. The pending application and the cited prior art of record (Giger et al; US 2001/0043729 A1) are not commonly assigned. As of the filing of the instant application, the assignee is University of Chicago. Conversely, the prior art of record (US 2001/0043729 A1) is assigned to Arch Development Corporation.

It is further submitted that prior art of record discloses the new limitation of displaying at least one database malignant abnormality and at least one database benign abnormality having similarity to the candidate abnormality (Figures 6 and 7; Paragraphs 0054 and 0055).

3. The examiner has considered the IDS filed November 17, 2003 and April 30, 2004, and an initialed copy is included with this office action.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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5. Claims 1-3, 5, 8-14, 17-19 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Giger et al., (hereinafter Giger), US 2001/0043729 A1.

As per claim 1, Giger teaches:

obtaining a medical image having a candidate abnormality [0026];

segmenting the candidate abnormality in the medical image [0034];

extracting at least one predetermined feature from the segmented candidate abnormality[0035];

comparing the candidate abnormality with plural database abnormalities including known malignant abnormalities and known benign abnormalities, including comparing the at least one extracted feature([0034], features such as...) from the at least one candidate abnormality with corresponding extracted features extracted from the database abnormalities;

identifying, based on the comparing step, at least one database malignant abnormality and at least one database benign abnormality having similarity to the candidate abnormality [0054]; and

displaying the at least one database malignant abnormality and the at least one database benign abnormality having similarity to the candidate abnormality identified in the identifying step (Paragraphs 0054 and 0055; Figures 6 and 7).

As per claim 2, Giger teaches:

extracting at least one feature from the group comprising effective diameter, contrast, degree of irregularity, pixel standard deviation, radial gradient index (RGI), and

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computed tomography (CT value) ([0024], The features merged to estimate likelihood of malignancy are radial gradient index and two density measures).

As per claims 3 and 5, they recite substantially the same limitations as claim 2 above, except they recite, "extracting at least two features" ([0024], radial gradient index and two density measures) and "extracting at least three features" ([0024], radial gradient index, one density measure and then the second density measure), respectively.

As per claim 8, Giger teaches:

obtaining a CT medical image. Giger's method is directed towards analyzing any digital image that a radiologist would also analyze. At [0070], Giger states that the method can be used with other medical images, which inherently includes CT images. It is inherent that CT images are included in Giger's disclosure because Giger's system is directed to digital medical images in general, which CT images are a subset.

As per claim 9, Giger teaches:

using a region growing technique [0035].

As per claim 10, Giger teaches:

region growing from a point included in a manually generated outline ([0035], "...region of interest manually or automatically centered around the abnormality in question.").

As per claim 11, Giger teaches:

using an artificial neural network (ANN) [0046]; and

determining a similarity measure based on an output of the ANN [0051].

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As per claim 12, Giger teaches:

using an ANN having at least three levels (input, hidden, output, [0046]).

As per claim 13, Giger teaches:

identifying at least one similar malignant database abnormality and at least one benign abnormality based on an output of the ANN [0024]; and

displaying the database abnormalities identified in the identifying step [0026].

As per claim 14, Giger teaches:

wherein the displaying step comprises displaying at least one candidate abnormality with at least one malignant abnormality and at least one benign abnormality on a common display (figs 6 and 7, [0026])

As per claim 17, Giger teaches:

displaying at least one candidate abnormality with at least one malignant abnormality and at least one benign abnormality on a common display (figs. 6 and 7, [0026]).

As per claim 18, Giger teaches:

A system implementing the method of any one of Claims 1 through 17 (fig. 9).

As per claim 19, Giger teaches:

A computer program product storing program instructions for execution on a computer system, which when executed by the computer system, cause the computer system to perform the method recited in any one of Claims 1 through 17 (fig. 9).

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Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger as applied to claim 1 above and Komiya et al., (hereinafter Komiya), US 5754676.

As per claim 4, it narrows claim 3 even further by limiting the two features to effective diameter and CT value, which Giger does not specifically teach the use of effective diameter or CT value. However, Komiya teaches determining the length of the contour of a malignant or benign tumor (col. 20, ll. 6-15, 49-50), this data clearly could be used by one of ordinary skill in the art to determine an "effective" diameter. Also, Komiya teaches conducting a CT test, col. 21, l. 13, which would return a result that could be classified as a CT value. Therefore, It would have been obvious to one of ordinary skill in the art to use the contour line data and a result from the CT test of Komiya as one of the inputs into Giger's neural network in order to determine malignancy or benignancy of a detected mass.

As per claim 6, it recites the same limitations as claim 4 above except it also includes the RGI feature as taught by Giger ([0024]). It would have been obvious to one of ordinary skill in the art to use the contour line data and a result from the CT test of Komiya as one of the inputs into Giger's neural network in order to determine malignancy or benignancy.

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8. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger, as applied to claim 11 above, and further in view of Guha, US 5373452.

As per claim 15, Giger does not teach that a subjective rating is used in the determination of similarity. However, Guha teaches using such a feature in a neural network environment. Therefore, Guha teaches:

training the ANN based on at least one subjective similarity rating (col. 1, ll. 14-22, col. 4, ll. 26-35).

It would have been obvious to one of ordinary skill in the art to use the subjective intangible property of Guha as one of the inputs into the neural network of Giger to capture the relationship between the subjective property and measurable physical properties of the feature under test because neural network models are inherently fault tolerant due to the distributive fashion in which they represent data (Guha, col. 1, ll. 51-55).

As per claim 16, Guha teaches:

using an ANN trained at least in part by means of at least one subjective similarity rating (col. 4, ll. 41-44.)

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Giger, as applied to claim 1 above, and further in view of Cabib et al. (hereinafter Cabib), US 5784162.

As per claim 7, Giger does not specifically teach an absolute difference determination between a candidate and reference feature. However, Cabib teaches:

calculating at least one similarity measure based on an absolute difference between at least one extracted feature (pixel wavelength spectrum) of the candidate abnormality and at least one corresponding feature of a database abnormality (reference spectrum) (col. 9, ll. 28-32, 45-48).

It would have been obvious to one of ordinary skill in the art to use the spectral pixel features as taught by Cabib as a feature to be extracted in the system of Giger because of the increased signal-to-noise ratio in spectral measurements thus allowing for better extraction of image shapes and more accurate classification.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mehrdad Dastouri
Primary Examiner
Art Unit 2623
May 11, 2004

MEHRDAD DASTOURI
PRIMARY EXAMINER
Mehrdad Dastouri